

Serial No.: 09/583,386
Examiner: Erik Kielin

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Canceled): A method of fabricating a microstructure in a sealed cavity comprising the steps of:

- providing a substrate having a substantially planar support surface;
- depositing a first layer of sacrificial material over said planar support surface;
- depositing an etchable layer of structural material over said first layer of sacrificial material;
- forming a microstructure on said support surface by etching said layer of structural material, said microstructure contacting said substrate at least at an anchor point;
- depositing a second layer of sacrificial material over said microstructure;
- depositing a cap layer over said second layer of sacrificial material, said cap layer extending from points on said support surface, whereby said cap layer and said support surface define a capsule about an interior region containing said microstructure and said first and second sacrificial layers;
- forming one or more holes in said cap layer;
- introducing a dry plasma etchant into said interior region through said one or more holes, wherein said sacrificial material is chosen to have a high etch rate differential with respect to said structural material, so that said dry plasma etchant removes said first and second sacrificial layers while leaving said microstructure and said substrate substantially intact, thereby releasing said microstructure as a movable structure secured at said anchor point to said substrate; and
- sealing said one or more holes in said cap layer with a seal layer, thereby forming a sealed cavity that encapsulates said movable microstructure, said sealed cavity being defined by said seal layer and said planar support surface.

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Claim 2 (canceled)

Claim 3 (Currently amended): The method of claim 1 wherein said substrate is a silicon wafer having a layer of silicon nitride deposited thereon.

Claim 4 (Currently amended): ~~The method of claim 1~~ A method of fabricating a microstructure in a sealed cavity comprising the steps of:

providing a substrate having a substantially planar support surface;
depositing a first layer of sacrificial material over said planar support surface;
depositing an etchable layer of structural material over said first layer of sacrificial material;
forming a microstructure on said support surface by etching said layer of structural material, said microstructure contacting said substrate at least at an anchor point;
depositing a second layer of sacrificial material over said microstructure;
depositing a cap layer over said second layer of sacrificial material, said cap layer extending from points on said support surface, whereby said cap layer and said support surface define a capsule about an interior region containing said microstructure and said first and second sacrificial layers;
forming one or more holes in said cap layer;
introducing a dry plasma etchant into said interior region through said one or more holes, wherein said sacrificial material is chosen to have a high etch rate differential with respect to said structural material, so that said dry plasma etchant removes said first and second sacrificial layers while leaving said microstructure and said substrate substantially intact, thereby releasing said microstructure as a movable structure secured at said anchor point to said substrate; and
sealing said one or more holes in said cap layer with a seal layer, thereby forming a sealed cavity that encapsulates said movable microstructure, said sealed cavity being defined by said

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seal layer and said planar support surface,

wherein said etchant is oxygen plasma, said sacrificial material is photoresist and wherein said structural material is aluminum.

Claims 5-20 (canceled):

Claim 21 (Currently amended): The method of claim 1 ~~4~~ wherein said etchant has a high etch rate with respect to said sacrificial material and a low etch rate with respect to said structural material and with respect to the materials forming said substrate and said cap layer.

Claim 22 (Previously presented): The method of claim 21 wherein said structural material is resistant to said etchant.

Claim 23 (canceled)

Claim 24 (Currently amended): The method of claim 1 ~~4~~, wherein the step of introducing said dry plasma etchant into said interior region through said one or more holes is performed using a barrel etcher.

Claim 25 (canceled)

Claim 26 (Currently amended): The method of claim 1 ~~4~~, wherein said one or more holes are etched into said cap layer so as to establish communication with said first and second layers of sacrificial material.

Claim 27 (withdrawn): An intermediate micromachined device, comprising:

A. a substrate having a substantially planar support surface on one side and a base surface on

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a side opposite said support surface, said planar support surface being characterized by a plane;

B. a first sacrificial layer deposited over said support surface;

C. a microstructure disposed at least in part above said plane and secured to said substrate at one or more points, said microstructure being formed by etching a structural layer deposited on said first sacrificial layer;

D. a second sacrificial layer deposited over said microstructure;

E. a cap layer extending from points on said planar support surface and deposited over said second sacrificial layer, said cap layer and said support surface defining a capsule about an interior region containing said microstructure and said first and second sacrificial layers; wherein said cap layer is adapted to have one or more ports formed therethrough; and wherein the materials forming said sacrificial layers and said structural layer are chosen so as to allow a dry plasma etchant, when introduced into said interior region through said one or more ports, to etch away said first and second sacrificial layers while leaving said microstructure substantially intact, thereby forming a cavity defined by said cap layer and said planar support surface, and releasing said microstructure as a movable suspended structure contained within said cavity.

Claim 28 (withdrawn): A device according to claim 27, wherein said microstructure comprises a MEMS (microelectromechanical system) device.

Claim 29 (withdrawn): A device according to claim 27, wherein at least a portion of said first sacrificial layer is in contact with at least a portion of said second sacrificial layer.

Claim 30 (withdrawn): A device according to claim 27, further comprising at least one metal contact disposed on said support surface for connecting said microstructure to said support surface of said substrate.

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Claim 31 (withdrawn): A device according to claim 27, wherein said substrate is a CMOS structure with said support surface being a passivation layer, and includes CMOS circuit devices defined within said substrate between said support surface and said base surface.

Claim 32 (withdrawn): A device according to claim 27, wherein said substrate is a silicon wafer coated with a passivation layer.

Claim 33 (withdrawn): A micromachined assembly, comprising:

- A. a substrate having a substantially planar support surface characterized by a plane;
- B. a microstructure disposed at least in part above said plane and having at least one end secured to said substrate at an anchor point;
- C. a cap layer extending from points on said planar support surface, said cap layer and said support surface defining a capsule about an interior region containing said microstructure;
- D. a seal layer extending from points on said planar support surface, said seal layer being disposed over and contiguous said cap layer.